XL.—*On Artificial Sea Water.*

By Robert Warington, Esq.

To the Editors of the Annals of Natural History.

Gentlemen,

In the 'Annals and Magazine of Natural History' for July last, you published a short communication from Mr. Gosse, on the artificial formation of sea water, and having lately had my attention especially directed to this paper by a friend who wished to put the formula given into practice, I was surprised at the difference in the proportions of the ingredients as compared with what I had myself employed in the course of 1853, more particularly from the circumstance, that when Mr. Gosse called upon me in January last, and consulted me on the feasibility of the plan, I told him that there could be no difficulty in the matter, as I had made and had then in use several small quantities artificially produced, and that all that was required was that a good analysis should be taken as the basis for deducing the proportions, and at the same time referred him to the source from which I myself had worked, namely Dr. E. Schweitzer's analysis of the water of the English Channel taken off Brighton.

Now, as numerous parties have been inquiring respecting this subject, and the erroneous formula has been copied into other journals, it may prevent much annoyance as well as disappointment if this matter is set right. The error appears to be twofold, the one arising from miscalculation, the other from assuming that the sulphate of magnesia as given in the analysis, represented the ordinary crystallized salt, and not the anhydrous sulphate, which is always the case in giving analytical results, and which is, indeed, so specified by Dr. Schweitzer in his paper, when he states that the dry residue obtained by the evaporation of 1000 grains of water amounts to 35·25628 grs., consisting of the following ingredients :—

Chloride of sodium . . .	27·05948 grains.
„ of magnesium . .	3·66658 „
„ of potassium . .	0·76552 „
Bromide of magnesium . .	0·02929 „
Sulphate of magnesia . .	2·29578 „
Carbonate of lime	0·03301 „
Sulphate of lime	1·40662 „

Now, as these results all stand in the same denomination, grains, it is competent for us to treat them as pounds, ounces, or any other weight that may best suit our purpose, and as the decimal

notation is so readily capable of facilitating these deductions, there is no difficulty in at once arriving at the correct relations. Thus, the gallon of water being equal to 10 pounds, if we wish to estimate the proportions of materials for that quantity, or for 100 pounds, 10 gallons, it only requires that the decimal point should be removed, in the first case, two figures, or, in the latter, one figure to the left, and we have the whole operation completed and the result exhibited in decimal fractions of the pound; thus for 100 lbs. or 10 gallons:—

Chloride of sodium . . .	2·706	
„ of magnesium .	0·367	
„ of potassium . .	0·076	
Bromide of magnesium .	0·003	anhydrous = 0·472
Sulphate of magnesia . .	0·230	crystals.
„ of lime	0·140	anhydrous = 0·178
Carbonate of lime . . .	0·003	crystallized sulphate.

It will be observed, that in order to simplify the notation I have decreased the extended places of decimals and employed the nearest amount to such fraction, by this means throwing off three places of figures. Then by reducing these decimal fractions to the nearest value in terms of avoirdupoise pounds and ounces, the proportions will stand thus for the 100 pounds of water produced:—

		Gosse.
Chloride of sodium	43¼ ounces.	35 ounces.
„ of magnesium	6 „	4½ „
„ of potassium	1¼ „	$0\frac{9}{10}$ „
Bromide of magnesium	21 grains.	——
Sulphate of magnesia anhydrous 3¾ oz. = crystals	7½ ounces.	2½ „
Sulphate of lime anhydrous 2¼ oz. = crystallized	2¾ „	——
Carbonate of lime	21 grains.	——

In order to exhibit the extent of the error I have alluded to, I have placed in the adjoining column the proportions deduced by Mr. Gosse from the same analysis and for the same quantity of water, one of the ingredients having been omitted, besides the two that exist in so small a quantity. Now, as Dr. Schweitzer's analysis is on a given weight of which the saline ingredients constitute a part, it becomes necessary to deduct their weight from the 10 gallons of water employed; this, it will be seen, amounts to 60¾ ounces, or in round numbers to 60 ounces, which is equal to three imperial pints, so that 9 gallons and 5 pints will be the true proportion of water to be used.

The next point that presents itself is as to the best mode of

obtaining these saline ingredients for the manufacture of the artificial sea water, as many of them, not being usually kept for sale, would have to be made for the purpose. There cannot be a question that by far the simplest plan would consist in the evaporation of the sea water itself in large quantities at the source, preserving the resulting salt in closely stopped vessels to prevent the absorption of moisture, and vending it in this form to the consumer; the proportion of this dry saline matter being $56\frac{1}{2}$ oz. to the 10 gallons of water, less the 3 pints. This plan was suggested by Dr. E. Schweitzer himself for the extemporaneous formation of sea water for medicinal baths, and, on inquiry since writing the above, I find that such a preparation is manufactured by Messrs. Brew and Schweitzer of No. 71 East Street, Brighton, under the title of "Marine Salts for the instantaneous production of sea water." Mr. H. Schweitzer writes me, that he has for many years made this compound in accordance with his cousin's analysis. The proportion ordered to be used is 6 oz. to the gallon of water and stirred well until dissolved.

Apothecaries' Hall, Nov. 1, 1854.

XLI.—*On the Genus* Mermis*. By Dr. G. Meissner. Analysis by Dr. W. I. Burnett†.

A memoir of great value has recently appeared upon these singular parasites, which has the double importance of quite clearing up the history of these animals in all their stages, and of furnishing a contribution to the histology of the lower animals of a most valuable character. This memoir has been prepared by G. Meissner of Munich, under the directions of Siebold, who furnished him with specimens and other opportunities for its successful prosecution. Seldom have we met with a paper of more careful and extended detail, and which leaves so little behind for investigators in the same direction. Added to this textual detail, every anatomical point is illustrated by admirably executed figures. With our limited space we can at best notice only a few of the more prominent points of this paper.

In the first place it should be remarked that the natural history of the *Gordiacei* was for a long time quite obscure and little understood, and many detached observations not of a parallel character did not improve the subject. To the sagacity

* Beiträge zur Anatomie und Physiologie von *Mermis albicans*. Von Dr. Georg Meissner. In Siebold und Kölliker's Zeitschrift für wissenschaftliche Zoologie, v. 1853, p. 207–285.

† From Silliman's American Journal of Science and Arts for July 1854.